

LIST OF CONTENTS

Number 1

J. C. Kayser and K. S. Knaebel	1	Pressure swing adsorption: development of an equilibrium theory for binary gas mixtures with nonlinear isotherms
L. Chiao and R. G. Rinker	9	A kinetic study of ammonia synthesis: modeling high-pressure steady-state and forced-cycling behavior
E. M. Sevick, P. A. Monson and J. M. Ottino	21	Morphology and transport using the Ising lattice as a morphology description
Wang Kai and Yu Shengyao	33	Heat transfer and power consumption of non-Newtonian fluids in agitated vessels
T. Chattaway and G. Stephanopoulos	41	Adaptive estimation of bioreactors: monitoring plasmid instability
G. Pop, G. Musca, E. Chirila, R. Boeru, G. Niculae, N. Natu, G. Ignatescu and S. Straja	49	Coke deposits formation and products selectivities for the MTG process in a fluidized bed reactor
R. H. Borgwardt	53	Sintering of nascent calcium oxide
M. Wallin and I. Bjerle	61	A mass transfer model for limestone dissolution from a rotating cylinder
M. Sheintuch and S. Brandon	69	Deterministic approaches to problems of diffusion, reaction and adsorption in a fractal porous catalyst
S. Ilias and P. L. Douglas	81	Inertial impaction of aerosol particles on cylinders at intermediate and high Reynolds numbers
L. G. Gibilaro, R. Di Felice, I. Hossain and P. U. Foscolo	101	The experimental determination of one-dimensional wave velocities in liquid fluidized beds
H. Yamazaki, H. Yazawa and K. Miyanami	109	Effect of mixing on esterification of cephalosporic acid in a solid-liquid system
Y.-M. Chen and L.-S. Fan	117	Bubble breakage mechanisms due to collision with a particle in a liquid medium
C. G. Vayenas, S. Pavlou and A. D. Pappas	133	Optimal catalyst distribution for selectivity maximization in nonisothermal pellets: the case of consecutive reactions
A. L. Zydny, W. M. Saltzman and C. K. Colton	147	Hydraulic resistance of red cell beds in an unstirred filtration cell
M. R. Prairie, B. H. Shanks and J. E. Bailey	161	Intentional manipulation of closed-loop time delay for model validation using feedback-induced bifurcation
S. Ganesan, P. B. Lloyd, G. L. Gilleskie and P. K. Lim	171	Segregation and chemical conversion at oil-water interface
C. C. Chen and E. B. Nauman	179	Verification of a complex, variable viscosity model for a tubular polymerization reactor

List of Contents

	<i>Shorter Communications</i>	
A. Seidel and P. S. Carl	189	The concentration dependence of surface diffusion for adsorption on energetically heterogeneous adsorbents
F. Potůček and J. Stejskal	194	Oxygen absorption in polymeric solutions in a bead column
S. Okamura, S. Uchida, T. Katsumata and K. Iida	196	Measurement of solids holdup in a three-phase fluidized bed by an ultrasonic technique
E. Nagy, T. Bickle and A. Ujhidy	198	Spherical effect on mass transfer between fine solid particle and liquid accompanied by chemical reaction
	<i>Book Reviews</i>	
K. Peet	203	Equilibrium Staged Separations. By P. C. Wankat
N. A. Warner	203	Ion Exchange and Sorption Processes in Hydrometallurgy. Edited by M. Streat and D. Naden
P. L. Yue	204	Advances in Chemical Engineering, Vol. 13
	205	Corrigenda

Number 2

A. Lyngfelt and B. Leckner	207	SO ₂ capture in fluidised-bed boilers: re-emission of SO ₂ due to reduction of CaSO ₄
L. N. Sa, G. D. Focht, P. V. Ranade and D. P. Harrison	215	High-temperature desulfurization using zinc ferrite: solid structural property changes
N. Douss and F. Meunier	225	Experimental study of cascading adsorption cycles
M. Castier, P. Rasmussen and Aa. Fredenslund	237	Calculation of simultaneous chemical and phase equilibria in nonideal systems
H. Li and M. Kwaak	249	Vertical pneumatic moving-bed transport—I. Analysis of flow dynamics
H. Li and M. Kwaak	261	Vertical pneumatic moving-bed transport—II. Experimental findings
A. Penlidis, J. F. MacGregor and A. E. Hamielec	273	Continuous emulsion polymerization: design and control of CSTR trains
P. A. Aguirre and N. J. Scenna	283	Optimal thermodynamic synthesis of dual-purpose desalination plants
K. J. Kim and K. Y. Choi	297	Modeling of free radical polymerization of styrene catalyzed by unsymmetrical bifunctional initiators
R. E. Lebrun, C. R. Bouchard, A. L. Rollin, T. Matsuura and S. Sourirajan	313	Computer simulation of membrane separation processes
E. Garcia Calvo	321	A fluid dynamic model for airlift loop reactors
D. Barnea and Y. Taitel	325	Transient-formulation modes and stability of steady-state annular flow
W.-M. Lu and S.-J. Ju	333	Cavity configuration, flooding and pumping capacity of disc-type turbines in aerated stirred tanks
H. V. Nordén and M. A. Pekkanen	343	General calculation method for stagewise models of mass and heat transfer operations

R.-H. Jean and L.-S. Fan	353	A fluid mechanic-based model for sedimentation and fluidization at low Reynolds numbers
Y. J. Huang and L. J. Lee	363	Optimization of diffusion-controlled free radical polymerizations in a distributed parameter system
D. P. Busker, A. P. G. G. Lamers and J. K. Nieuwenhuizen	377	The non-linear break-up of an inviscid liquid jet using the spatial-instability method
S. Hartland, S. A. K. Jeelani and A. Suter	387	Inertial effects in thin film drainage
P. E. Savage and M. T. Klein	393	Asphaltene reaction pathways—V. Chemical and mathematical modeling
P. K. Agarwal and W. J. Mitchell	405	Generalized Reynolds number, drag curve and interphase transport phenomena in viscous flow
S. L. Kissinger and S.-J. Khang	417	The pore-filling model for a macroporous catalyst pellet with three different types of fouling mechanisms
T. Akiyama and H. Kurimoto	427	The impulse of the collision between vibrating particle beds and a vessel base
<i>Shorter Communications</i>		
A. Gorak and G. Rogacki	433	A new model of equimolar multicomponent mass transfer in a boundary layer
B. Berdouzi, P. C.-H. Chan and D. G. Retzloff	436	Maximal steady-state multiplicity of two consecutive first-order reactions in a continuous-flow stirred-tank reactor
H. Y. Sohn and D. R. Wall	442	Application of the law of additive reaction times to the regeneration of coked catalyst pellets
K. Stamatakis and C. Tien	445	Additional work on the gravity separation of suspensions containing heavy and light particles
A. Mehra	448	Intensification of heterogeneous reactions through the use of water-in-oil media
P. A. Davies and B. J. Bellhouse	452	Permeability of beds of agarose-based particles
<i>Book Reviews</i>		
P. G. Caudle	457	Petrochemicals: the Rise of an Industry. By P. J. Spitz
P. B. Whalley	457	Handbook of Numerical Heat Transfer. Edited by W. J. Minkowycz, E. M. Sparrow, G. E. Schneider and R. H. Pletcher

Number 3

E. T. Wilkinson and G. A. Davies	459	The application of percolation theory to the analysis of sieve blinding
A. Sharma and D. White, Jr	471	Effects of gas depletion on gas-liquid reaction systems
S. Kaguei, L. W. Shemilt and N. Wakao	483	Models and experiments on adsorption columns with constant wall temperature—radially varying and radially lumped models
P. Wnukowski and F. Setterwall	493	The coating of particles in a fluidized bed (residence time distribution in a system of two coupled perfect mixers)
G. C. Stangle and R. Mahalingam	507	Mass transfer with chemical reaction during gas bubble formation in foam column reactors

S.-S. Jang and W.-L. Yang	515	Dynamic optimization of batch emulsion polymerization of vinyl acetate—an orthogonal polynomial initiator policy
P. Ayazi Shamlou and E. Koutsakos	529	Solids suspension and distribution in liquids under turbulent agitation
S. J. Parulekar, P. V. Shertukde and J. B. Joshi	543	Underutilization of bubble column reactors due to desorption
S. H. Gehrke and E. L. Cussler	559	Mass transfer in pH-sensitive hydrogels
S.-S. Suh and P. C. Wankat	567	A new pressure swing adsorption process for high enrichment and recovery
L. K. Filippov	575	Theoretical basis of separation processes and adsorption dynamics of multicomponent mixtures
J. C. Escudero, R. Simarro, S. Cervera-March and J. Giménez	583	Rate-controlling steps in a three-phase (solid–liquid–gas) photoreactor: a phenomenological approach applied to hydrogen photoproduction using Pt–TiO ₂ aqueous suspensions
M. C. Colantonio, J. Moiola, A. Desages and J. Romagnoli	595	Hopf bifurcation in a CSTR using characteristic loci
H. M. Park and D. E. Rosner	603	Multiphase continuum theory of dopant redistribution across aerosol-laden laminar nonisothermal boundary layers
H. W. Andersen, M. Kümmel, A. N. Hansen and K. Nielsen	619	Tuning of dual-composition distillation column control
H. A. Al-Ghawas, G. Ruiz-Ibanez and O. C. Sandall	631	Absorption of carbonyl sulfide in aqueous methyl-diethanolamine
O. Floarea and S. Straja	641	A non-isothermal grid model for catalytic fluidized-bed reactors
R. R. Melkote and K. F. Jensen	649	Models for catalytic pore plugging: application to hydro-demetallation
S. L. Kokal and J. F. Stanislav	665	An experimental study of two-phase flow in slightly inclined pipes—I. Flow patterns
S. L. Kokal and J. F. Stanislav	681	An experimental study of two-phase flow in slightly inclined pipes—II. Liquid holdup and pressure drop
M. Lundén and B. Andersson	695	Enhanced mass transfer and selectivity due to electrochemical transport in catalytic reactions
R. Krishna and A. K. Saxena	703	Use of an axial-dispersion model for kinetic description of hydrocracking
A. Anderko	713	Calculation of vapor–liquid equilibria at elevated pressures by means of an equation of state incorporating association
S. Sieniutycz	727	Experimental relaxation times, drying–moisturizing cycles and the relaxation drying equation
L. Gradoń and A. Podgóński	741	Hydrodynamical model of pulmonary clearance
S. K. Bhatia	751	Dynamics of continuous precipitation under non-stoichiometric conditions

D. W. Bousfield	763	Thinning of a viscoelastic film
<i>Shorter Communications</i>		
J. W. Ponton	769	Analytical approximations for the fixed-temperature phase split calculation
S. C. Saxena and A. Mathur	774	A model for the projection of solid particles from the surface of a gas-fluidized bed
N. Epstein	777	On tortuosity and the tortuosity factor in flow and diffusion through porous media
T. E. Holt and D. M. Smith	779	Surface roughness effects on Knudsen diffusion
J. T. Suarez, C. Torres-Marchal and P. Rasmussen	782	Prediction of surface tensions of nonelectrolyte solutions
<i>Book Review</i>		
A. Lyddiatt	787	Bioseparations: Downstream Processing for Biotechnology. By P. A. Belter, E. L. Cussler and W.-S. Hu
	789	Errata

Number 4

A. Vetere	791	Estimation of critical pressures by the Rackett equation
L. Czepirski and J. Jagiełło	797	Virial-type thermal equation of gas-solid adsorption
P. A. Aguirre, E. O. Pavani and H. A. Irazoqui	803	Comparative analysis of pinch and operating line methods for heat and power integration
F. A. Saita	817	Simplified models of flexible blade coating
P. E. Grimshaw, A. J. Grodzinsky, M. L. Yarmush and D. M. Yarmush	827	Dynamic membranes for protein transport: chemical and electrical control
J. MacPhee and R. L. Cerro	841	Performance analysis of brush dampeners
D. A. White	851	The use of cascade theory to formulate fluid carrier mass balances for multi-stage plants connected in a simple countercurrent mode
Y. J. Lu and B. W. Brooks	857	Effects of start-up procedure on the emulsion polymerisation of vinyl acetate in a continuous-flow back-mixed reactor
B. P. K. Yung, H. Merry and T. R. Bott	873	The role of turbulent bursts in particle re-entrainment in aqueous systems
F. Y.-C. Chin and P. K. Lim	883	The peroxide-coupling kinetics and dissociation constants of aqueous cysteine and glutathione: experimental and model results, and implications
Wang Zhonglai	895	Analysis of two-dimensional expression of semi-solid materials on cylindrical surfaces
B. H. Shanks and J. E. Bailey	901	Application of the feedback-induced bifurcation method to a catalytic reaction system
W. Pasiuk-Bronikowska and J. Ziajka	915	Kinetics of aqueous SO ₂ oxidation at different rate controlling steps
W. Y. Tawfik and A. S. Teja	921	The densities of polyethylene glycols

J. L. Castillo and D. E. Rosner	925	Theory of surface deposition from a unary dilute vapor-containing stream allowing for condensation within the laminar boundary layer
J. L. Castillo and D. E. Rosner	939	Equilibrium theory of surface deposition from particle-laden dilute, saturated vapor containing laminar boundary layers
A. K. Ghosh and J. J. Ulbrecht	957	Bubble formation from a sparger in polymer solutions—I. Stagnant liquid
A. K. Ghosh and J. J. Ulbrecht	969	Bubble formation from a sparger in polymer solutions—II. Moving liquid
G. F. Carey and P. Murray	979	Perturbation analysis of the "shrinking core"
P. E. Savage and M. T. Klein	985	Kinetics of coupled reactions: lumping pentadecylbenzene pyrolysis into three parallel chains
<i>Shorter Communications</i>		
B. J. McCoy	993	Adsorption chromatography of a heterogeneous mixture
D. Petrović, D. Poštarac and D. Skala	996	Hysteresis effects of minimum fluidization velocity in a draft tube airlift reactor
K. Ahmed, L. Kershenbaum and D. Chadwick	999	Sintering effects in a nickel-alumina catalyst
S. Jullian, A. Barreau, E. Behar and J. Vidal	1001	Application of the SBR equation of state to high molecular weight hydrocarbons
J. C. R. Turner and I. H. Yellowlees	1004	Taylor dispersion in pipe flow: a medical example
<i>Book Reviews</i>		
C. Forster	1007	<i>A Handbook of Water Purification.</i> By W. Lorch
T. J. K. Rolfe	1007	<i>Introduction to Hazardous Waste Incineration.</i> Edited by L. Theodore and J. Reynolds
T. R. Bott	1008	<i>Practical Thermodynamic Tools for Heat Exchanger Design Engineers.</i> By H. Soumerai
P. J. Briggs	1009	<i>Thermal Methods of Oil Recovery.</i> By T. C. Boberg

Number 5

<i>Announcement</i>		
Fourth P. V. Danckwerts Memorial Lecture		
D. M. Ruthven and C. B. Ching	1011	Review Article Number 31. Counter-current and simulated counter-current adsorption separation processes
A. C. Kridiotis, J. P. Longwell, A. F. Sarofim and E. Bar-Ziv	1039	Application of a stochastic model of imperfect mixing to the combustion of fuel-lean CO-H ₂ mixtures in air
V. R. Choudhary, D. B. Akolekar and A. P. Singh	1047	Single- and multicomponent sorption/diffusion of hydrocarbons from their iso-octane solution in H-ZSM-5 zeolite
J. R. DiAndreth and M. E. Paulaitis	1061	Multiphase behavior in ternary fluid mixtures: a case study of the isopropanol-water-CO ₂ system at elevated pressures
O. Molerus and J. Schweizer	1071	Resistance of particle beds at Reynolds numbers up to $Re \approx 10^4$

M. Sheintuch	1081	Spatio-temporal structures of controlled catalytic wires
P. Salatino and L. Massimilla	1091	A predictive model of carbon attrition in fluidized bed combustion and gasification of a graphite
J.-I. Kim and P. Stroeve	1101	Uphill transport in mass separation devices with reactive membranes: counter-transport
J. P. K. Peeler and J. R. Huang	1113	Segregation of wide size range particle mixtures in fluidized beds
D. M. Fraser	1121	The use of minimum flux instead of minimum approach temperature as a design specification for heat exchanger networks
S. R. Kay, S. K. Scott and A. S. Tomlin	1129	Quadratic autocatalysis in a non-isothermal CSTR
P. Verlaan, A. M. M. van Eijs, J. Tramper, K. van't Riet and K. Ch. A. M. Luyben	1139	Estimation of axial dispersion in individual sections of an airlift-loop reactor
Je. Alvarez, J. Alvarez and E. González	1147	Global nonlinear control of a continuous stirred tank reactor
Jo. Alvarez and Je. Alvarez	1161	Solution of dynamic summation-difference equations by adaptive collocation
J. Baldyga	1175	Turbulent mixer model with application to homogeneous, instantaneous chemical reactions
V. K. Tzouanas and S. L. Shah	1183	Adaptive pole-assignment control of a batch polymerization reactor
D. Ziolkowski and S. Szustek	1195	Effect of fluid velocity radial profile on the radial mass dispersion in a fluid stream in a packed bed tubular apparatus
M. Starzak and R. Zarzycki	1205	Singular points in the problem of steady-state multiplicity for the stirred tank with consecutive reactions
G. V. Bhaskar and D. D. Do	1215	A simple solution for nonisothermal adsorption in a single particle
H. I. de Lasa, A. Ravella, E. Rost and A. Mahay	1221	Operation of coaxially cooled fixed-bed catalytic reactors: conditions of existence of the pseudoadiabatic regime
C. R. Brunold, J. C. B. Hunns, M. R. Mackley and J. W. Thompson	1227	Experimental observations on flow patterns and energy losses for oscillatory flow in ducts containing sharp edges
A. Leitão and A. Rodrigues	1245	Studies on the Merox process: kinetics of <i>N</i> -butyl mercaptan oxidation
J. R. Turner and H. J. Fissan	1255	Convective diffusion of particles in external force fields: the role of electrostatics on particle removal from turbulently-mixed gases
R. E. Sioda	1263	<i>Shorter Communications</i> Normal cylinder-in-flow-tube mass transfer problem with inclusion of parabolic flow velocity distribution
G. F. Versteeg and M. H. Oyevaar	1264	The reaction between CO ₂ and diethanolamine at 298 K
E. Garcia Calvo	1269	<i>Letters to the Editors</i> Comments on liquid circulation in airlift reactors

M. Y. Chisti and M. Moo-Young	1270	Authors' reply to comments by E. Garcia Calvo
Q. Shi	1271	Comments on The Journal of Chemical Industry and Engineering (China), English Edition, Vol. 1, Parts 1 and 2
 <i>Book Reviews</i>		
H. Hofmann	1273	Chemistry Data Series: Vol. 4, Parts 1 and 2. Recommended Data of Selected Compounds and Binary Mixtures; Vol. 8, Part 1. Solid-Liquid Equilibrium Data Collection. Edited by D. Behrens and R. Eckerman
C. F. H. van Rijn	1273	Dynamics and Control of Chemical Reactors and Distillation Columns. Edited by C. McGreavy
 Number 6		
D. T. Lynch and G. Emig	1275	On the separability of catalyst activity and kinetic behavior
E. Boe and H.-C. Chang	1281	Dynamics of delayed systems under feedback control
S. Dimitrova Al Khani, C. Gourdon and G. Casamatta	1295	Dynamic and steady-state simulation of hydrodynamics and mass transfer in liquid-liquid extraction column
R. Y. Qassim, S. Kinrys and D. E. Benveniste	1307	Effect of voidage variation on flow past a fluidisation bubble
A. Jedrzejak, A. Gorius and D. Tondeur	1315	Some consistency problems arising in the description of equilibrium adsorption of mixtures
G. Storti, M. Masi, S. Carrà and M. Morbidelli	1329	Optimal design of multicomponent countercurrent adsorption separation processes involving nonlinear equilibria
J. R. Bourne and H. Gablanger	1347	Local pH gradients and the selectivity of fast reactions—II. Comparisons between model and experiments
Y. Taitel, O. Shoham and J. P. Brill	1353	Simplified transient solution and simulation of two-phase flow in pipelines
W. Pasiuk-Bronikowska and T. Bronikowski	1361	Kinetic model of sulphite autoxidation under heterogeneous conditions
K. Okuyama, J.-T. Jeung, Y. Kousaka, H. V. Nguyen, J. J. Wu and R. C. Flagan	1369	Experimental control of ultrafine TiO ₂ particle generation from thermal decomposition of titanium tetraisopropoxide vapor
M. L. Call and R. H. Kadlec	1377	Estimation of micromixing parameters from tracer concentration fluctuation measurements
J. Mydlarz and A. G. Jones	1391	Growth and dissolution kinetics of potassium sulphate crystals in aqueous 2-propanol solutions
K. Fichthorn, E. Gulari and R. Ziff	1403	Self-sustained oscillations in a heterogeneous catalytic reaction: a Monte Carlo simulation
G. Li and H. Rabitz	1413	A general analysis of exact lumping in chemical kinetics
J. Xu and U. Hoffmann	1431	Application of integral transformation and orthogonal collocation in gas-solid non-catalytic reaction with varying diffusivity, temperature and bulk gas concentration
W. J. Bruining	1441	A general description of flows and pressures in hollow fiber membrane modules

H. Kurimoto, M. Matsubara, N. Watanabe and K. Shimizu	1449	<i>Shorter Communications</i> Stage-switching operation for enhanced periodic distillation
W. Asher and J. F. Pankow	1451	Direct observation of concentration fluctuations close to a gas-liquid interface
I.-S. Suh and W.-D. Deckwer	1455	Unified correlation of heat transfer coefficients in three-phase fluidized beds
M. A. Soliman	1459	Collocation with low-order polynomials for fast reactions in catalyst particles
	1461	Corrigenda
		<i>Announcements</i>
	1463	Fluid-Particle Interactions II
	1463	ISCRE 11: Call for Papers
	1464	5th International Symposium on Catalyst Deactivation
 Number 7		
S.-J. Khang and G. L. Fowler	1465	The use of a slow pseudo-first-order reaction to estimate the size of micro-mixed volume in a flow system
A. W. Dickens, M. R. Mackley and H. R. Williams	1471	Experimental residence time distribution measurements for unsteady flow in baffled tubes
R. Collins	1481	A model for the effects of the voidage distribution around a fluidization bubble
J. Szarawara and A. Gawdzik	1489	Method of calculation of fugacity coefficient from cubic equations of state
M. Shacham	1495	An improved memory method for the solution of a nonlinear equation
J. C. Kantor	1503	A finite dimensional nonlinear observer for an exothermic stirred-tank reactor
A. Marmur	1511	Kinetics of displacement of a liquid from a capillary: the effect of limited reservoirs
B. Li and J. Fu	1519	Prediction of interfacial tension of binary liquid mixtures from mutual solubility by the UNIQUAC method
T. Virág, G. Gy. Halász and J. B. Zhelev	1529	Simulation of continuous drying processes by integral equations
J. Comiti and M. Renaud	1539	A new model for determining mean structure parameters of fixed beds from pressure drop measurements: application to beds packed with parallelepipedal particles
Y.-L. Hwang and F. G. Helfferich	1547	Dynamics of continuous countercurrent mass-transfer processes—III. Multicomponent systems
T. Fornari, E. Rotstein and G. Stephanopoulos	1569	Studies on the synthesis of chemical reaction paths—II. Reaction schemes with two degrees of freedom
S. S. E. H. Elnashaie, M. E. E. Abashar and A. S. Al-Ubaid	1581	<i>Shorter Communications</i> Non-monotonic behaviour of the effectiveness factor along a catalyst bed

Z. Palaty	1585	Viscosity of diluted aqueous NaOH/Na ₂ CO ₃ solutions
T. Gürkan and N. Kartal	1588	The effect of nonlinear investment function on the optimum structure of the petrochemical industry
S. V. Save, S. S. Zanwar and V. G. Pangarkar	1591	Solid-liquid mass transfer to rotating impellers
T. Akiyama, H. Kurimoto and K. Nakasaki	1594	An unusual air pressure reversal within vibrating particle beds
E. B. Nauman	1597	<i>Letter to the Editors</i> Comments on residence time distribution of a power-law fluid in Kenics static mixers
J. R. Bourne	1599	<i>Book Review</i> Chemical Reactors: Design, Engineering, Operation. By P. Trambouze, H. van Landeghem and J.-P. Wauquier
	1601	<i>Announcements</i> 10th International Congress of Chemical Engineering, Chemical Equipment Design and Automation
	1601	CHEMeca 1990: Australasian Chemical Engineering Conference
 Number 8		
	iii	Danckwerts-Maxwell Prize
N. Vatistas	1603	The effect of adhesion time on particle deposition
E. Richter, W. Schütz and A. L. Myers	1609	Effect of adsorption equation on prediction of multicomponent adsorption equilibria by the ideal adsorbed solution theory
R. S. Krzywanski, N. Epstein and B. D. Bowen	1617	Spout diameter variation in two-dimensional and cylindrical spouted beds: a theoretical model and its verification
J. Kucharski and A. Kmiec	1627	Kinetics of granulation process during coating of tablets in a spouted bed
E. W. Nägele	1637	The transient zeta potential of hydrating cement
R. J. Roberts, R. C. Rowe and K. Kendall	1647	Brittle-ductile transitions in die compaction of sodium chloride
R. J. Wijngaarden and K. R. Westerterp	1653	Do the effective heat conductivity and the heat transfer coefficient at the wall inside a packed bed depend on a chemical reaction? Weaknesses and applicability of current models
Wu Yuan	1665	Estimation of states and parameters by invariant imbedding technique
M. Morbidelli and A. Varma	1675	A generalized criterion for parametric sensitivity: application to a pseudohomogeneous tubular reactor with consecutive or parallel reactions
J. Li and H. Weinstein	1697	An experimental comparison of gas backmixing in fluidized beds across the regime spectrum
D. D. Do	1707	Sorption rate of bimodal microporous solids with an irreversible isotherm

W. J. DeCoursey and R. W. Thring	1715	Effects of unequal diffusivities on enhancement factors for reversible and irreversible reaction
A. Kapoor and R. T. Yang	1723	Kinetic separation of methane–carbon dioxide mixture by adsorption on molecular sieve carbon
K. H. Byeon and I. J. Chung	1735	Analysis of the multiple Hopf bifurcation phenomena in a CSTR with two consecutive reactions—the singularity theory approach
<i>Shorter Communication</i>		
M. Hartman, V. Havlin, O. Trnka and M. Čárský	1743	Predicting the free-fall velocities of spheres
<i>Book Reviews</i>		
J. C. R. Turner	1747	Irreversible Thermodynamics—Theory and Applications. By K. S. Førland, T. Førland and S. K. Ratje
R. Hughes	1747	Activation, Deactivation and Poisoning of Catalysts. By J. B. Butt and E. E. Petersen
J. J. Benbow	1748	Ultrastructure Processing of Advance Materials. Edited by J. D. Mackensize and D. R. Ulrich
J. S. Puttock	1749	Guidelines for Use of Vapor Cloud Dispersion Models. By S. R. Hanna and P. J. Drivas
J. S. Higgins	1749	Polymers in Colloid Systems: Absorption, Stability and Flow. Edited by Th. F. Tadros

Number 9

A. G. Fredrickson, G. R. Gavalas, W. H. Ray and A. Varma	1751	Editorial
N. R. Amundson	1753	Rutherford Aris
G. Ballal and N. R. Amundson	1761	(RA) of Minnesota
B. B. Fish and R. W. Carr	1763	Preliminary report on burning of single particles of retorted shale
R. A. Novy, P. G. Toledo, H. T. Davis and L. E. Scriven	1773	An experimental study of the countercurrent moving-bed chromatographic reactor
H. T. Davis	1785	Capillary dispersion in porous media at low wetting phase saturations
D. G. Young and M. M. Denn	1799	On the statistics of randomly broken objects
M. Feinberg	1807	Disturbance propagation in melt spinning
G. R. Gavalas, C. E. Megiris and S. W. Nam	1819	Necessary and sufficient conditions for detailed balancing in mass action systems of arbitrary complexity
R. D. Bartusiak, C. Georgakis and M. J. Reilly	1829	Deposition of H ₂ -permselective SiO ₂ films
J. E. Gatica, H. J. Viljoen and V. Hlavacek	1837	Nonlinear feedforward/feedback control structures designed by reference system synthesis
R. Jackson	1853	Interaction between chemical reaction and natural convection in porous media
	1871	Equilibrium in the presence of external body force fields

P. E. Price, Jr and K. F. Jensen	1879	Multiplicities and periodic behavior in laser direct-write metallization
I. G. Kevrekidis and H. S. Brown	1893	Predicting pattern formation in coupled reaction-diffusion systems
D. Lauffenburger	1903	A simple model for the effects of receptor-mediated cell-substratum adhesion on cell migration
V. R. Dabholkar, V. Balakotaiah and D. Luss	1915	Stationary concentration patterns on an isothermal catalytic wire
F. J. Doyle III, A. K. Packard and M. Morari	1929	Robust controller design for a nonlinear CSTR
D. Ramkrishna and P. Arce	1949	Can pseudo-homogeneous reactor models be valid?
F. Teymour and W. H. Ray	1967	The dynamic behavior of continuous solution polymerization reactors—IV. Dynamic stability and bifurcation analysis of an experimental reactor
G. A. Cordonier and L. D. Schmidt	1983	Thermal waves in NH ₃ oxidation on a Pt wire
P. G. Georgopoulos and J. H. Seinfeld	1995	Nonlocal description of turbulent dispersion
D. E. Steinmeyer and M. L. Shuler	2017	Structured model for <i>Saccharomyces cerevisiae</i>
G. Stephanopoulos and K. Tsiveriotis	2031	The effect of intraparticle convection on nutrient transport in porous biological pellets
C. A. Tsiliannis and S. A. Svoronos	2041	Dynamic interactors in multivariable process control—II. Time delays and zeroes outside the unit circle
C. G. Takoudis and M. M. Kastelic	2049	Selective epitaxial growth of silicon in a barrel reactor
M. C. Regalbuto, W. Strieder and A. Varma	2063	Approximate solutions for nonlinear diffusion-reaction equations using the Maximum Principle: a case involving multiple solutions
K. Zygourakis	2075	Transient operation of monolith catalytic converters: a two-dimensional reactor model and the effects of radially nonuniform flow distributions

Number 10

L. C. Windes, A. Cinar and W. H. Ray	2087	Dynamic estimation of temperature and concentration profiles in a packed bed reactor
J. S. Condoret, J. P. Riba and H. Angelino	2107	Mass transfer in a particle bed with oscillating flow
A. Koshy, R. Kumar and K. S. Gandhi	2113	Effect of drag-reducing agents on drop breakage in stirred dispersions
D. J. Kozub, J. F. MacGregor and T. J. Harris	2121	Optimal IMC inverses: design and robustness considerations
T. Nishimura, S. Arakawa, S. Murakami and Y. Kawamura	2137	Oscillatory viscous flow in symmetric wavy-walled channels

R. C. Zumstein and R. W. Rousseau	2149	Agglomeration of copper sulfate pentahydrate crystals within well-mixed crystallizers
H. S. McLaughlin and E. B. Nauman	2157	An exact lumping technique for step growth polymerizations
D. Colson and D. Vanhove	2165	Solubility of alkanes in <i>o</i> -terphenyl for Fischer-Tropsch liquid-phase reactor study. Modelization of liquid-vapor equilibrium
V. Vesovic and W. A. Wakeham	2181	Prediction of the viscosity of fluid mixtures over wide ranges of temperature and pressure
R. Yadav and R. G. Rinker	2191	The efficacy of concentration forcing
A. Byrne, R. Hughes and J. Santamaria	2197	The influence of operating and coke-related variables on the regeneration of fixed beds of catalyst
H. Wu and G. K. Patterson	2207	Laser-Doppler measurements of turbulent-flow parameters in a stirred mixer
J. C. R. Turner	2223	On the reduction by heat transfer of mass transfer from an evaporating liquid
H. M. Park and D. E. Rosner	2225	Boundary layer coagulation effects on the size distribution of thermophoretically deposited particles
H. M. Park and D. E. Rosner	2233	Combined inertial and thermophoretic effects on particle deposition rates in highly loaded dusty-gas systems
S. Munjal, M. P. Duduković and P. Ramachandran	2245	Mass-transfer in rotating packed beds—I. Development of gas-liquid and liquid-solid mass-transfer correlations
S. Munjal, M. P. Duduković and P. Ramachandran	2257	Mass-transfer in rotating packed beds—II. Experimental results and comparison with theory and gravity flow
A. K. Adebekun, K. M. Kwalik and F. J. Schork	2269	Steady-state multiplicity during solution polymerization of methyl methacrylate in a CSTR
S. G. Chatterjee and C. Tien	2283	Adsorption with chemical reaction in a single modified-carbon pellet
G. F. Versteeg, J. A. M. Kuipers, F. P. H. van Beckum and W. P. M. van Swaaij	2295	Mass transfer with complex reversible chemical reactions—I. Single reversible chemical reaction
S. Feyo de Azevedo and A. P. Wardle	2311	Sensitivity analysis concerning the design and operation of a tubular fixed-bed catalytic reactor
G. Astarita and R. Ocone	2323	Heterogeneous chemical equilibria in multicomponent mixtures
S. Veeraraghavan, L. T. Fan and A. P. Mathews	2333	Modeling adsorption in liquid-solid fluidized beds
K. Rajamani	2345	Reaction of an irregular particle with a gas: Monte Carlo method for the solution of the pellet-grain model
C. H. Young and W. J. Korchinsky	2355	Modelling drop-side mass transfer in agitated poly-dispersed liquid-liquid systems
J. W. Hamer	2363	Stoichiometric interpretation of multireaction data: application to fed-batch fermentation data
P. Nowak and J. Skrzypek	2375	<i>Shorter Communications</i> The kinetics of chemical decomposition of ammonium bicarbonate and carbonate in aqueous solutions

K. Klusácek, R. R. Hudgins and P. L. Silveston	2377	Multiple steady states of an isothermal catalytic reaction with Elovich adsorption
A. Gilchrist, K. N. Dyster, I. P. T. Moore, A. W. Nienow and K. J. Carpenter	2381	Delayed phase inversion in stirred liquid-liquid dispersions
S. R. Bhutada and V. G. Pangarkar	2384	Solid suspension and mixing characteristics of liquid jet loop reactors
O. Shoham, S. Arirachakaran and J. P. Brill	2388	Two-phase flow splitting in a horizontal reduced pipe tee
M. A. Buzanowski, R. T. Yang and O. W. Haas	2392	Direct observation of the effects of bed pressure drop on absorption and desorption dynamics
M. Loewenberg	2394	Reactant flux into a medium containing spherical sinks: the time-dependent problem
G. Jayaraman, V. Seshadri and A. Kumar	2398	The effect of two-phase nature of blood on the gas exchange in capillary membrane oxygenators
Gy. Vatai and M. N. Tekić	2402	Gas hold-up and mass transfer in bubble columns with pseudoplastic liquids
S.-S. Suh and P. C. Wankat	2407	Pressure swing adsorption process for binary gas separation with Langmuir isotherms
G. K. Whiting	2411	<i>Letters to the Editors</i> Comments on measuring and modelling residence time distribution of low density solids in a fluidized bed reactor of sand particles
F. Berruti	2412	Author's reply to comments by G. K. Whiting
V. Linek and V. Vacek	2413	Comments on dynamic analysis of homogeneous reactions in a stirred bubble reactor: oxidation of sulfite
J. M. Smith, B. J. McCoy and C. C. Fu	2416	Authors' reply to comments by V. Linek and V. Vacek
W. M. Edwards and H. N. Kim	2417	Comments on multiple steady states in FCC unit operations
	2419	Corrigenda

Number 11

v Fourth P. V. Danckwerts Memorial Lecture

M. Kwauk	2421	Fourth P. V. Danckwerts Memorial Lecture presented at the Institute of Directors, London, U.K., 2 May 1989: Legacy and growth—chemical engineering in China
A. N. R. Bos, P. C. Borman, M. Kuczynski and K. R. Westerterp	2435	The kinetics of the methanol synthesis on a copper catalyst: an experimental study
V. N. Burganos and S. V. Sotirchos	2451	Knudsen diffusion in parallel, multidimensional or randomly oriented capillary structures
A. B. Pandit, C. D. Rielly, K. Niranjan and J. F. Davidson	2463	The convex bladed mixed flow impeller: a multipurpose agitator

K.-S. Kim and S. E. Pratsinis	2475 Modeling and analysis of modified chemical vapor deposition of optical fiber preforms
A. Palazoglu and T. Khambanonda	2483 On the use of the numerical range for the robust stability problem
V. Kaloidas and N. Papayannakos	2493 Kinetics of thermal, non-catalytic decomposition of hydrogen sulphide
M. A. Latifi, N. Midoux, A. Storck and J. N. Gence	2501 The use of micro-electrodes in the study of the flow regimes in a packed bed reactor with single phase liquid flow
G. A. Funk, M. P. Harold and K. M. Ng	2509 Reactant adsorption effects on partially wetted catalyst performance
O. Rosen and R. Luus	2527 Sensitivity of optimal control to final state specification by a combined continuation and nonlinear programming approach
P. S. Kumbhar and G. D. Yadav	2535 Catalysis by sulfur-promoted superacidic zirconia: condensation reactions of hydroquinone with aniline and substituted anilines
C. Han, H. Huang and A. Drescher	2545 An approximate analysis of unsteady flow of granular materials in bin/hopper structures
J. D. Pults, R. A. Greenkorn and K.-C. Chao	2553 Chain-of-rotators group contribution equation of state
S. Kaguei, N. Ono and N. Wakao	2565 Parameter estimation in batch adsorption with a linear isotherm
H. W. Andersen, M. Kümmel and S. B. Jørgensen	2571 Dynamics and identification of a binary distillation column
H. W. Andersen and M. Kümmel	2583 Discrete-time control of a binary distillation column
O. Agamennoni, H. Rotstein, A. Desages and J. A. Romagnoli	2597 Robust controller design methodology for multivariable chemical processes: structured perturbations
A. Wolny and W. Kaźmierczak	2607 Triboelectrification in fluidized bed of polystyrene
S. Pushpavanam and R. Narayanan	2611 Ignition and extinction in a model problem with parallel endothermic and exothermic reactions
V. S. Patwardhan	2619 Diffusion and sorption in zeolites—I. A Markov process formulation
V. N. Burganos and S. V. Sotirchos	2629 Effective diffusivities in cylindrical capillary-spherical-cavity pore structures
H. K. D. Hsuen and S. V. Sotirchos	2639 Multiplicity analysis of intraparticle char combustion
H. K. D. Hsuen and S. V. Sotirchos	2653 Multiplicity analysis of char combustion with homogeneous CO oxidation
Z. Kravanja and P. Glavić	2667 Heat integration of reactors—II. Total flowsheet integration
M. A. Buzanowski and R. T. Yang	2683 Extended linear driving-force approximation for intraparticle diffusion rate including short times
M. H. Oyevaar and K. R. Westerterp	2691 The use of the chemical method for the determination of interfacial areas in gas-liquid contactors

G. K. Georgeton and A. S. Teja	2703 A simple group contribution equation of state for fluid mixtures
N. Brauner, D. Moalem Maron and W. Zijl	2711 Interfacial collocation equations of thin liquid film in the presence of interfacial shear: stability analysis
H. Bosch, G. F. Versteeg and W. P. M. van Swaaij	2723 Gas-liquid mass transfer with parallel reversible reactions—I. Absorption of CO ₂ into solutions of sterically hindered amines
H. Bosch, G. F. Versteeg and W. P. M. van Swaaij	2735 Gas-liquid mass transfer with parallel reversible reactions—II. Absorption of CO ₂ into amine-promoted carbonate solutions
H. Bosch, G. F. Versteeg and W. P. M. van Swaaij	2745 Gas-liquid mass transfer with parallel reversible reactions—III. Absorption of CO ₂ into solutions of blends of amines
<i>Shorter Communications</i>	
H. Merta and J. Ziolo	2751 Thickener cascade with various thickening ratios
S. Ichikawa	2754 Virtual-pressure concept in gas-solid reactions
H. K. S. Tan	2756 General solutions of second-order kinetics for fixed-bed sorption processes
W.-Y. Chen and G. L. Fouch	2760 The role of polymer support crosslinking on reaction rates for solid-phase peptide synthesis
Y.-M. Chen and L.-S. Fan	2762 Bubble breakage due to particle collision in a liquid medium: particle wettability effects
M. Rashid	2767 Dynamic measures of sensitivity and operability of a chemical reactor
M. Hartman, V. Havlík, K. Svoboda and A. P. Kožan	2770 Predicting voidage for particulate fluidization of spheres by liquids
D. A. White	2775 The design of ideal separation cascades

Number 12

P. M. Armenante and D. J. Kirwan	2781 Mass transfer to microparticles in agitated systems
J. L. Huckaby and A. K. Ray	2797 Absorption of sulfur dioxide by growing and evaporating water droplets
S. Farooq, D. M. Ruthven and H. A. Boniface	2809 Numerical simulation of a pressure swing adsorption oxygen unit
J. Plewa and J. Skrzypek	2817 Kinetics of the reduction of copper oxide with carbon monoxide
A. M. Gadalla and M. E. Sommer	2825 Carbon dioxide reforming of methane on nickel catalysts
R. O. Fox	2831 Steady-state IEM model: singular perturbation analysis near perfect-micromixing limit
S. T. Kolaczkowski and U. Ullah	2843 Measurement of effective diffusivities using a spinning basket reactor
M. Mattea, M. J. Urbicain and E. Rotstein	2853 Computer model of shrinkage and deformation of cellular tissue during dehydration
S. S. Alves and J. L. Figueiredo	2861 A model for pyrolysis of wet wood

F. Durst and H. Raszillier	2871 Analysis of particle-wall interaction
M. A. Rivero, R. T. Tranquillo, H. M. Buettner and D. A. Lauffenburger	2881 Transport models for chemotactic cell populations based on individual cell behavior
R. B. H. Tan and J. F. Davidson	2899 Liquid-particle jets from fluidised beds
C. M. Crowe	2909 Observability and redundancy of process data for steady state reconciliation
G. D. Focht, P. V. Ranade and D. P. Harrison	2919 High-temperature desulfurization using zinc ferrite: regeneration kinetics and multicycle testing
M. Berezowski and A. Burghardt	2927 A generalized analytical method for determining multiplicity features in chemical reactors with recycle
D. Ridgway, R. N. Sharma and T. R. Hanley	2935 Determination of mass transfer coefficients in agitated gas-liquid reactors by instantaneous reaction
H. A. Preisig	2943 Estimation of mismatch errors of dynamic models for stirred tank-reactor equipment—I. Heat exchange with jacket, impact of model reduction
H. A. Preisig	2957 Estimation of mismatch errors of dynamic models for stirred tank-reactor equipment—II. Heat dissipation in the contents, impact of mixing
J. H. Petropoulos, J. K. Petrou and N. K. Kanellopoulos	2967 Explicit relation between relative permeability and structural parameters in stochastic pore networks
S. J. Lee, O. H. Campanella and M. Peleg	2979 Squeezing flow of a double layered array of two Newtonian liquids
C. Kleinstreuer and T.-Y. Wang	2987 Mixed convection heat and surface mass transfer between power-law fluids and rotating permeable bodies
R.-S. Li and H.-J. Li	2995 Isolas, mushrooms and other forms of multistability in isothermal bimolecular reacting systems
J. S. Vrentas and C. M. Vrentas	<i>Shorter Communication</i> 3001 Boundary conditions for chemically reactive surfaces
J. W. Ponton	<i>Book Reviews</i> 3005 Optimization of Chemical Processes. By T. F. Edgar and D. M. Himmelblau
J. A. Howell	3005 Membrane Processing. By R. Rautenbach and R. Albrecht
I. J. Dunn	3006 Airlift Bioreactors. By M. Y. Chisti
D. E. Brown	3007 Biotechnology for Engineers: Biological Systems in Technological Processes. Edited by A. H. Scragg

